

ENCAPSULATION OF VITAMIN D₃ IN CASEIN-BASED MICROCAPSULES BY ISOELECTRIC PRECIPITATION USING HIGH PRESSURE CARBON DIOXIDE

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A novel process for encapsulation of active ingredients using casein as matrix by high pressure carbon dioxide is herein presented. When sodium caseinate solution with active substance is sprayed into pressured carbon dioxide, the active substance will be trapped in casein matrix precipitated at the same time because of isoelectric condition caused by high pressure carbon dioxide, which is intitled here the process of isoelectric precipitation by high pressure carbon dioxide (IPHPCD). One kind of fat-soluble vitamin, Vitamin D₃ which is essential for calcium metabolism, was used as a model of hydrophobic nutraceutical compound. The process variables (like pressure, temperature, concentration and mixing method etc.) were studied. The vitamin D₃ was successfully co-precipitated into the protein pellet without any organic solvents which imply the quality of encapsulation can significantly reduce downstream process. It was shown that the protein matrix can provide partial protection against photochemical degradation to vitamin D₃ contained in them. This study suggests that IPHPCD is an effective method of encapsulation of active substance using natural GRAS (generally regarded as safe) ingredients such as protein which can be useful as microcapsules for entrapment, protection and delivery of sensitive hydrophobic nutraceuticals.

Keyword: carbon dioxide; isoelectric precipitation; microcapsule; casein; nutraceuticals

This work was supported by a grant from the National High Technology Research and Development Program of China (863 Program) (No.2007AA10Z350).

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